

# Notes on some peculiar cases of Phytogeographic distributions

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(With two plates)

## INTRODUCTION

The flora of a place is above all the result of phylogenesis which has bestowed to the area a certain number of species through the evolutionary history. The prevailing climate acts as a sieve of big dimension permitting only those species of the allotted stock to thrive whose tolerance range fall within the limits imposed by the climate. Soil factors act as a sieve of finer dimension operating further selection in the fraction passed on by the climate. Biotic factors, mainly man and his domesticated animals introduce a further check on the vegetation. Man's action has been on the destructive side mostly, but even when protective like the silvicultural treatments, it is at the expense of a large number of species that a couple of economic ones are favoured. He and his cattle have degraded the optimum stages of the natural vegetation which are as a rule forests to thickets or savannas. He also plays an important role in extending the areas of species, intentionally or accidentally.

## BIOTIC FACTORS

### Anthropogenic

The accidental introduction may be illustrated at least with reference to three species.

(1) ***Capparis decidua*** (Forsk.) Pax—The distribution of *Capparis decidua* is discontinuous. It is spread over Northern Tropical Africa, Egypt, Arabia, Persia and West Pakistan; in India it covers Rajasthan, Northern Gujarat and the Deccan from Julwania up to Bijapur. After a considerable discontinuity it reappears in the extreme south-east part of the Peninsula. Its introduction in this south-east corner via the ship route from Africa may be a possibility as is also suggested by the distribution pattern of *Acacia planifrons*.

(2) ***Acacia planifrons*** W. & A. (Plate 1) The Umbrella Thorn Tree is distributed mainly over the semi-arid area of south-east corner

of India near Tuticorin and Pamban in Tirunelveli and Ramanathapuram districts and at a few localities in Madurai and Coimbatore districts. It is found also in Bellary but is planted there. After a long discontinuity in the Peninsular India, the species is encountered near Porbandar (Kathiawar) which is and which was a port of some importance in the past like Tuticorin. Morphologically the species is closely allied to *A. spirocarpa* Hochst. ex A. Rich. of North-East Africa and Arabia (Fyson 1919; Viart 1963). The Map shows the distribution of *A. planifrons*.

Marco Polo during his return from China (1291-1295), visited a part of India. One of his observations was concerning the flourishing horse trade between the ports of south Arabia (notably Aden) and Cail, a port of south India which has presently disappeared but which was at the mouth of the Tambraparani River in Tirunelveli District (Hambis 1955; Viart 1963).

Annually about 10,000 horses were imported. A good number of these perished due to lack of care and had to be replaced. Marco Polo notes that the Sultans of the Arabian and the Persian Gulf ports received considerable revenues because of this commerce. This trade continued for a long time even in the hands of Portugese after the Arabs. Panikkar (1958) also reports that the Portugese supplied persian horses to the Vijayanagar Empire.

This important trade route between Arabia, Africa and the above mentioned ports of India may be responsible for the accidental introduction of the species in India where over centuries it has emerged as a species only slightly distinct from the African-Arabian member.

(3) **Hyphaene indica** Becc. The Indian Doum Palm has been reported from the sandy coast of Daman, Diu and near Bombay (Seshagiri Rao 1963, 1964; Abraham 1969). Hence the endemic occurrence of the species in the erstwhile Portugese territories is a noteworthy feature. Besides, *H. indica* has close morphological affinities with *H. thebaica* (L.) Mart. of Africa.

This peculiar genus of branched palm is concentrated in Africa, Madagascar, and Arabia with as many as 30 species (Willis 1967). *H. indica* seems to be a case of early introduction on the west Coast of India.

#### Anamalous Distribution

The discontinuous patchy distribution of *Hardwickia binata* Roxb. in peninsular India is a puzzle.

**Hardwickia binata** is encountered on acid parent rock, genissic complex, sandstone or quartz in the plateau region of Andhra Pradesh,

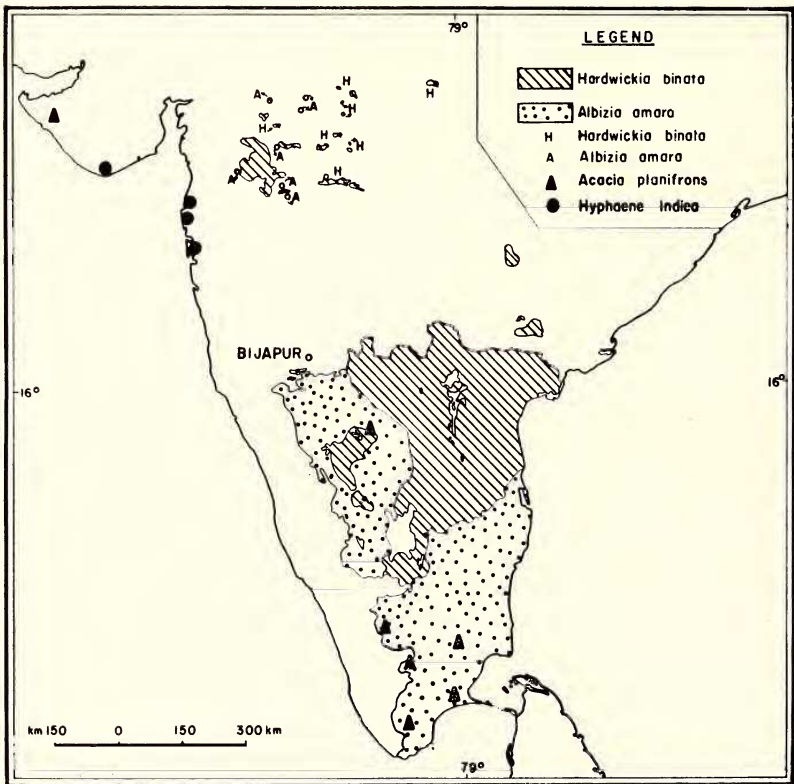


*Acacia planifrons* with its characteristic umbrella-shaped canopy.



*Hardwickia binata* in open forest. Note the normal appearance of the tree when not lopped.

(Photos: Author)



Above: *Hardwickia binata* (foreground) in tree-savanna. Note its deformed shape due to lopping and hacking. Below: Distribution of *Acacia planifrons*, *Hyphaene indica*, *Hardwickia binata* and *Albizia amara*

Mysore State and Salem District of Tamil Nadu. After a long discontinuity it reappears in the Malegaon Desh, the Satmala and the Satpura ranges of the Deccan trap country and in a few parts of the Vindhya and Mahadeo ranges (Map).

Another remarkable feature of its distribution is its complete absence in the Western Ghats. It occurs on the east-west oriented Satmala, Satpura, Mahadeo and Vindhya ranges but is conspicuous by its absence in the north-south oriented Sahyadris. It is found in discontinuous patches in NE-SW oriented hills of Eastern Ghats (in Andhra Pradesh and Tamil Nadu) and near Haveri, Harihar, Chitradurga, Hiriya and Tumkur (Mysore State) just to the east of the Western Ghats.

Rainfall range is 500 to 1200 mm. spread over a period of 4 to 6 months in the areas of *Hardwickia* but the distribution of the species has not been satisfactorily correlated with climatic and soil conditions. It is not uncommon to come across statements like "the distribution of *Hardwickia* is curious and not readily explicable," "distribution of *Hardwickia* cannot be logically explained" in the Working Plans.

Brandis (1911) noted that *Hardwickia binata* most commonly grows on sandstone, and if found on trap, as in south Berar, the rock is rich in veins of quartz.

According to Champion (1936) this species is the most characteristic of shallow hard gravelly soils over trap but occurs on a variety of other rocks though then more mixed with other trees.

In Satpura division of Chhindwara district *Hardwickia* occurs on sandstone with underlying marl,—a reddish, soft and crumbling material intermediate between rock and soil (Working Plan).

Mahabale & Karnik (1958) considered *Hardwickia* forests of the Satpura range in Maharashtra to be edaphic climax because they are found only in a few definite localities on recent alluvial formations. They further reported that calciferous soils inhibit its good growth whereas black soils with higher percentage of silica favours better growth.

Pataskar & Seshagiri Rao (1965-66) are of the opinion that in the Dhulia District *Hardwickia* is conspicuous on the leached out soils.

Bhatia (1959) on the other hand states that *Hardwickia* occurs on the calcareous soil in Madhya Pradesh and that it grows well on the black cotton soil. He describes a *Tectona-Hardwickia* forest on limestone in the Nimar division.

Karnik (1955) observes that the belt of *Hardwickia* in the Satpura range of Khandesh is associated with cherty or gritty soil. Pebbles of

white, yellow or red quartz and scanty and stunted nature of the grass growth are enumerated as the special features of the *Hardwickia* soil.

In the Working Plan of North and East Khandesh Division (1958) it is stated that the soil carrying *Hardwickia* forest is hard, gravelly or gritty with admixture of pebbles of quartz crunching under feet.

Because of its general association with skeletal soil, *Hardwickia* forests have been called as an edaphic type; however, we have observed this species on deep black soil in Andhra Pradesh.

From the foregoing it may be seen that contrasting views have been expressed as to the edaphic requirements of the species; this is because every study has been on a local scale and not covering the entire distribution range of *Hardwickia*.

Mall (1968) comparing the forest of Daultapur (in Dewas division at a distance of 113 km. from Bhopal) with that of Kalakund (in Mhow range about 40 km. from Indore) finds that *Hardwickia* is totally absent in the former. He attributes this difference to historical factor asserting that there is no significant difference in soil characters of the two forests.

We would like to emphasise here the role of human interference and grazing.

In the Working Plan of the Buldana sub-division (W. Berar Dn.) it is stated that there has been no reproduction in *Hardwickia* forests for at least 20 years. Seeding may not be good each year but it has been abundant every 3 to 5 years. After each seeding, a number of seedlings come up but they are all destroyed in the summer. It may also be added that *Hardwickia* does not coppice like other trees of the deciduous forest.

Grazed areas show indications of reproduction having been killed back by browsing or badly hacked about by graziers. Burning and grazing are quoted as the devastating biotic factors in the *Hardwickia* forests by Champion & Seth (1965). Cattle and goats are fond of *Hardwickia* leaves and the trees in the vicinity of villages are badly lopped and hacked for fodder (Plate I and II). Great is the utility of the tree in dry years like 1966 when it was chiefly responsible for feeding the herds in absence of grasses, in some drought-stricken parts of Madhya Pradesh (Pers. Comm., D.N. Pateria, D.F.O., Khargon). In short, unassisted *Hardwickia* reproduces itself extremely slowly.

There is some natural regeneration of this species by seeds in E. and N. Khandesh divisions as also in Satpura division, Chhindwara District where the site factors are favourable. *Hardwickia* resists fire but